

List of exercises 4

The file LFP_HG_HFO.mat contains simultaneous recordings of 2 LFP channels (in mV) from two different hippocampal layers. These channels were labeled lfpHG and lfpHFO. Sampling rate is 1000 Hz.

Write a script to execute – on different blocks of code – the following:

- 1) Filter both LFPs on theta (5 to 10 Hz) and gamma (65 to 100 Hz) frequency ranges and store the resulting data in new variables.
- 2) Compute the amplitude envelope of both filtered signals.
- 3) Create a figure with two subplots. On (2,1,1) plot the filtered theta signals alongside their amplitude envelopes, and on (2,1,2) do the same for the filtered gamma signals.
- 4) On different subplots, show scatterplots for all possible combinations of the time series obtained in 2). Display the correspondent linear correlation values as subplot titles.
- 5) Using lfpHG, plot, without overlapping, the raw signal (non-filtered) as well as both theta and gamma filtered signals alongside their amplitude envelopes. Set X axis limits to 40 and 44 seconds.
- 6) Compute and plot the amplitude spectrum for both signals (lfpHG and lfpHFO).
- 7) Compute and plot the continuous time-frequency decomposition (TFD) (i.e., using filters and amplitude envelopes) for both signals.